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DEPARTMENT OF AGRICULTURE
LIVE STOCK COMMISSIONER'S BRANCH
POULTRY DIVISION

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Live Stock Commissioner

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Chief of Poultry Division

DISEASES AND PARASITES OF POULTRY

BULLETIN No. 9

Published by direction of the Hon. SYDNEY A. FISHER, Minister of Agriculture, Ottawa, Ont.

MAY, 1905

To

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OTTAWA, May 1, 1905.

To the Honourable
The Minister of Agriculture.

Sir,—I beg to transmit herewith bulletin 'Diseases and Parasites of Poultry,' by
P. C. Elford, Chief of the Poultry Division, and to recommend that it be printed for
distribution.

I have the honour to be, sir,

Your obedient servant,

F. W. HODSON,

Live Stock Commissioner.

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DISEASES AND PARASITES OF POULTRY

THE DISEASES OF POULTRY.

1. Treatment of Poultry Diseases.—The treatment of poultry diseases should seldom concern the farmer. If the healthiest and most vigorous breeding fowls are kept, the chickens reared under satisfactory conditions, fed on wholesome food and not overcrowded, and the buildings kept thoroughly clean and disinfected, there will rarely be disease among them. When disease does appear, it will usually be found more satisfactory to kill and bury the sick birds than to treat the disease.

The poultry houses should be thoroughly cleaned out and disinfected by the use of a good spray pump. A good spray mixture may be made from a 2 per cent solution of chloride of lime or creolin or carbolic acid. Spray every square inch of everything inside, roof, walls, roosts, &c. Close up and allow the fumes to act a few hours, then open and ventilate.

The poultry yards, if situated so that they cannot be ploughed and cropped, should be treated with unslaked lime dust. Scrape the yards clean of manure and refuse, scatter the lime thick on the ground, then sprinkle the lime with water from the spray pump. This will slake the lime and cause it to destroy any germs of parasites in the soil.

2. Causes of Diseases of Poultry.—The most troublesome diseases of fowl, with their causes, may be summed up as follows :—

Roup.—Planted by 'only a neglected slight cold.'

Cholera.—Caused principally by overcrowding.

Diarrhœa.—Damp houses, filthy houses and runs, and bad feeding.

Canker.—Dampness and filth.

Diphtheria.—Roosting in draughts, damp houses.

Ulcerated Throat.—Ditto.

Consumption.—Neglected cold.

Apoplexy, Vertigo and Epilepsy.—Overfeeding.

Sore Eyes.—Damp houses

Costiveness and Constipation.—Improper food.

Soft and Swelled Crops, Indigestion and Dyspepsia.—Overfeeding.

Pip and Bronchitis.—Damp quarters.

Black Rot.—Result of indigestion.

Soft Eggs.—Overfeeding.

Gout, Rheumatism and Cramp.—Damp houses.

Leg Weakness.—Inbreeding and overfeeding.

Bumble Foot.—High perches.

Scaly Legs and Chicken Pox.—Filthy and damp quarters.

3. Gapes.—*Poultry, of London, England, says:* We have of late had many inquiries as to this ailment, so give our reply prominence. Gapes is a disease of youth, and attacks adults as seldom as the whooping cough attacks old people. It generally makes its appearances when the chickens are between four and eight weeks old, and rarely, if ever, has it been known to attack birds over four months old.

It is not a new disease, but one that has been known in connection with poultry, partridges, pheasants, and other birds for centuries. Opinions differ as to the actual origin of gapes, but there is no doubt as to the symptoms nor as to the exciting cause of the symptoms.

Symptoms.—The chicks are observed to open their mouths to the fullest extent, and 'gape' and have a short choking cough. Later on the cough increases in frequency, the gaping becomes almost constant, and the chick ultimately chokes and expires.

The cause of the distress is the presence of red worms at the root of the windpipe. When they first come they are very small (not larger than a thread), and have a bright, almost a vermilion, colour. They have, however, been taken out of chickens so large as almost to fill the windpipe half of its length. Two worms—a longer and shorter one—are frequently found joined together, the point of junction being about the middle of the longer worm. The largest worms are about the thickness of a stout pin. They are very active, and it is the tickling caused by their constant motion that causes the short dry cough and the gaping, in the futile endeavour to get rid of the pests.

Treatment.—There are divers cures and operations, but wherever the disease appears some chickens always die, and it would be well, before operating on the others, to open and examine the windpipe of one of the dead chickens yourself. If the disease that has caused death is gapes, the worms adhering to the mucous membrane of the windpipe will be seen; but if these are not present then death has been due to some other disease.

The original treatment recommended and followed by those, who, generations back, gave the disease its expressive name, was to take a hen's feather, stripped within an inch of its extremity, to place it down the windpipe, twist it sharply round, and withdraw suddenly. We have followed a similar plan to this when operating on turkey poults and strong chickens. We have found it advantageous to moisten the feather in spirits of turpentine before using it. The turpentine kills the worms—the feather must only be moistened, not soaked, with it, as a drop going into the lungs may be fatal to the chick—and the operation causes the bird to sneeze, and throw them up; that is, we may add, if performed by an old hand.

A difficulty is sometimes experienced by novices in getting the feather down the windpipe, but by holding the chick's beak open with the finger and thumb of the left hand applied from behind and pressing the throat of the chick slightly with the other fingers of the same hand, the opening of the windpipe can be clearly seen just behind the tongue, and down this the feather must be gently pushed as far as it will easily go.

Another method is to pass down horsehair loops, twist them, and withdraw them. But neither of these methods is very effectual, as it always leaves some worms behind, and they increase and multiply. The operations, too, have to be performed with great care, as the feather is often put down the gullet, which is useless, and with small chickens, which are most seriously affected, it is altogether out of the question.

Still other methods of cure that are recommended is to place the chicks in a box of chips soaked in turpentine, or to give them a little piece of bread with some turpentine on it. Carbolic acid fumes are also advised by some. The best plan of managing the administration of these is to confine the chicks in an air-tight house or large box, and place over a small petroleum stove, an old kettle or other similar vessel with about one-fourth part of crude carbolic acid and three parts water. The boiling fluid will give off a strong carbolic vapour, and cause the chicks to cough violently. This process, however, requires careful supervision, or the carbolic fumes may become too powerful for the chickens, and they may succumb.

On this account a cure was required that could be used without interfering with the windpipe, and would also be simple and effectual. It could only be done by using something sufficiently powerful to pervade the system, and to reach by its odor both the seat and the cause of the disease. Nothing that we have used have we found to do it so effectually as camphor, given at intervals in pills the size of a grain of wheat. That which is given to a fowl or pheasant must of necessity remain some time in the crop in close proximity to the windpipe. As soon as the odor reaches the worms they die, and the disease ceases with their death.

Whenever premonitory symptoms are observed immediate action should be taken. They may often be arrested by giving the birds no other water to drink than that which

is strongly impregnated with camphor, known to our grandmothers as 'camphor julep,' and believed to be a panacea for most disorders, and, more than that, a preventive. A good solution to put in the water in the place of camphor is as follows: Dissolve 2 oz. of sulphate of iron in sixty drops of sulphuric acid. After it has stood twenty-four hours mix it with two gallons of water. Let it stand two days, and then administer it by putting a teaspoonful to a pint of water.

It is thought, and we agree with it, that these parasites are gained by drinking bad water. All fowls prefer drinking from a puddle of dirty rain water to any vessel or clean spring water. The opportunity should not therefore be afforded them. Scrupulous cleanliness with liberal use of disinfectants (such as carbolic powder), and the separation of the affected chicks from the others, are the only means of prevention.

The ground is said to become tainted with the germs of this disease, so it is as well, where possible, to avoid putting chicks where the gapes have been. Old birds do not catch it; chickens recover if they can outlive the worms.

In Canada it is believed, gapes are usually due to filth, the eating of the residuum of food previously given, and feeding in damp places. It is believed that they are propagated in earth worms, but no facts have yet been discovered regarding such claim. The best remedy for gapes, if the chicks will eat, is to add a teaspoonful of spirits of turpentine to a mixture of one pint corn meal and a half pint of middlings. Thoroughly incorporate the turpentine with the dry material, then scald as much of the material as may be required, and feed to the chicks on a clean board. Put ten drops of carbolic acid in every pint of drinking water, and change the water frequently. There is no sure remedy for gapes, and inserting feather tips in the windpipe to draw out the gape worms can be done only by an experienced person. There are suggested remedies, but they are sometimes as fatal to the chicks as the gapes.

A little spirits of camphor rubbed on the outside of the throat and a few grains of the gum administered internally will sometimes give relief. Where possible, the ploughing the runs deeply every spring and sowing to rye and repeating the operation about September 1st, act as a preventive. Where the yards are so situated as to make ploughing impossible they should be cleaned and spaded frequently.

4. Bowel Trouble in Chicks.—If a chick is strong enough to break the shell, it is strong enough to live if it gets half a chance. I would not give a penny for a chick that was hatched on the 22nd day, nor for a chick that must be helped out of the shell. No care can save them, not even a hen. A chick should pip the shell on the 20th day, and be hatched on the morning of the 21st day. I have followed nature for years in this respect, and have made it a study, says Mr. J. Sontag, in the *American Poultry Journal*. Continuing he says:—'We will suppose that the chicks leave the shell in the incubator on Sunday. We allow them to remain there until Tuesday morning, when they are taken out and placed in a brooder. On the brooder floor I always keep two inches of sand; the chicks will eat the sand like wheat, and when they are 60 to 70 hours old I feed them their first meal, and I desire to call special attention to the fact that they are 60 to 70 hours old before they are fed. Nature has provided for the chick for from four to six days by furnishing the yolk of the egg. To demonstrate this take a five to six-day old crippled chick or one which can be killed without loss and you will find the yellow of the egg in the stomach. This proves that just as long as a chick has this it will live, and it will not starve or even be hungry.'

The cause of so many chicks dying and having bowel trouble is indigestion; they are fed too early. This I can prove to you in a half dozen different ways. Why do not the chicks have bowel trouble when running with the hens and looking for their own food? Why are birds in a wild state not troubled in this manner? They get their food often and a little at the time; it is a seed here and an insect there, and so until at night their crops are full of nature's food.

I have lost as many chicks as any large breeder in America for the last fifteen years and have tried all kinds of food, and have experimented upon how much to feed and when to feed and what kinds of food are the most suitable.

When the chicks are 60 to 70 hours old I let them out in the grass and sprinkle dry bread crumbs amongst them; in about an hour I give them a little dry oatflake; I give them just a little of that and they will run around over the grass looking for insect life. They seem to find food material of this kind which is not visible to us. About two hours later I give them a little millet seed and grass seed mixed, then in about three hours, or at night, I give them fine cracked corn, not corn meal, but cracked corn and milk that has been boiled; boiled milk and milk curds are the best preventive of bowel trouble. I give them milk until they are ten days old; some prefer milk in water, but if water is given it should be warm. The next day at 6 a.m. I give them johnny cake, about 11 hours later I feed them cracked wheat. At each meal except at night they are given about a half crop full, and at night a full crop; never give them a crop full of feed at any other meal, and never feed the same food twice the same day; change at each meal and give a little at each meal; then you are following nature. One-third crop full is a great deal better than a full crop. A hungry chicken is always a healthy one.

When a chick is weakly, hangs its wings, stands listless and is slow in walking and in fact seemingly blind to the world, it is suffering from indigestion, and the cause can be put down to overfeeding and too early feeding after having been taken out of the incubator. The chick in some respect resembles a baby. If an infant is fed for the first meal meat, potatoes and pastry of all kinds, it will not live long, because it is not nature's food, and this same rule applies to the chicks; they should have a little of everything and very little of anything. This method we believe is a successful one without any doubt.

Allow them to run out on the grass as soon as they possibly can, and when six days old give them free range.

Keep the heat in the brooder at 98 degrees two inches from the floor and keep it at about that point until the chicks are full feathered. Most breeders reduce that heat one or two degrees each day until it is about 70 degrees, but I fail to see any good reason why this plan should be followed.

A hen when she broods her chickens has a temperature of 98 degrees, or blood heat. We believe it is not more necessary to reduce the heat in a brooder than it would be in the case of the hen, as she broods the chickens when they are six weeks old. If your brooder is arranged like mine the chicks can go where they like, as regards the temperature. They will find it from 70 to 100.

We advise against mixing grit in food and against feeding mash. A fowl has a gizzard and grinds its own food and when the gizzard is idle the engine of the chick stops and finally the stomach gets out of order. Mash food has caused more diseases than any other one thing. In the first place it is not natural; the gizzard must keep grinding food, and if mash is fed the food passes through without being ground. The chick also overeats and suffers from indigestion.

There is much in the kind of heat in a brooder as well as the amount. A brooder should have a natural heat and not a hot dry one; there should also be fresh air coming and going at all times in the hover. If you will examine the chicks found dead in the brooder you will find their legs are all dried up. The hot dry heat has this effect on the blood and lungs, as a hot air furnace does upon furniture, &c. This kind of heat is not healthy for man or fowl.

On rainy days the brooder should be inside for chicks that are only two weeks old so as to keep them dry. They should be given the run of a large room, for keeping them locked up in a brooder will play havoc with them. There should be an in-door brooder for this purpose until chicks are 18 days old, and they should then be put in an out-door brooder, as they are old enough to help themselves.

Other Chick Troubles.—If a chick appears weak, or has weak legs, from rapid growth, put a teaspoonful of citrate of iron and ammonia in each quart of the drinking water. Sometimes two drops of tincture of nux vomica in a quart of water is excellent.

Lice on Young Chicks; Look for them.—When your young chicks are two or three days old, examine their heads for head-lice. They are big, brown fellows and will be found anterior downwards, getting a living out of the head of their prey. If your chicks are 'hen-hatched' you will almost be sure to find them; if incubator-hatched, less likely so. Lard rubbed well on the top of the head will soon kill all the lice there and will also prevent their appearance. At the same time dust well the mother hen and if this is done and runs kept clean, you will not be bothered with lice, but it will be well to examine the chicks at least once a week to see that all is right.

5. Rheumatism and Cramps.—Rheumatism is an inflammation of the joints accompanied by swelling, stiffness and pain when walking is attempted. Hock joints are usually hot and swollen. Bird squats in out of the way places, does not eat and mopes, apparently suffering great pain. The disease is more frequent in damp locations. It is probably hereditary and the result of breeding from debilitated stock.

Cramps in chicks are probably a form of rheumatism, affecting young chicks and due to similar causes. Among the predisposing causes are over-heating in the brooders, brooding on a smooth board floor, lack of sufficient ventilation, exposure to dampness and all conditions of bad hygiene.

Treatment.—Feed an abundance of succulent food, a small amount of animal food or meat, and all the meal in the form of dry grain. In the drinking water use 6 to 12 granulus Rhus Tox 3x in each pint of drinking water.

6. Diarrhœa in Small Chicks.—Diarrhœa in small chicks or pasting up behind may result from many causes. It is often due to breeding from debilitated stock or to errors in incubation. It may be caused by chilling, over-heating or improper feeding. Half a dozen tablets of mercury bichloride 3x or nux vomica and sulphur comp. 2x mixed in a pint of drinking water and feeding a little charcoal with daily food will usually remedy the trouble. Change the method of feeding. Try feeding johnny-cake. Find the cause of the trouble and remove it if possible.

7. Indigestion.—Indigestion is a disorder affecting the entire digestive system, the crop and intestines. It may result from general debility, but it is usually caused by improper feeding or over-feeding or feeding condition powders and condiments in excess. Lack of grit, feeding too much soft food, insufficient variety and lack of green food are all causes. Any part or the whole of the digestive system may be affected.

Symptoms.—The more common form is a disorder of the crop, known as soft or pour crop. The crop is distended and full of food and a thick fluid which has a foul odor. The stringy food falls from the bird's mouth whenever the head is lowered to pick up bits of grain. The bird drinks frequently, has very little appetite and is inclined to be dumpish. Other common symptoms of indigestion are lack of appetite, diarrhœa one day, constipation the next and a tendency to loaf about the poultry house in a corner or on the roost, instead of scratching in the litter for grain.

Treatment.—When the bird gets in this condition (which should not be permitted, as it can usually be avoided by giving them good care), the poultry house should be cleaned up, the litter renewed with fresh material; all food should be dry, hard grain fed in the litter. Mash and other wet messes should not be given. A limited amount of fresh, green food may be fed, the grit box should be kept full of good grit and shell. In the drinking water use twelve tablets of nux vomica and sulphur comp. 2x to each pint of drinking water. Continue the treatment until the fowls are in good condition.

8. Limber-neck.—This is due to disorder of the nervous system. The bird's neck appears limber and hangs downward, the bird is unable to raise its head, the neck may be turned back upon the body. It is usually the result of reflexes caused by disturbances of the digestive organs from severe attacks of indigestion or from worm parasites

Treatment.—Give the bird a small piece of gum asafoetida about the size of a split pea. Repeat the dose the next day. This will prove effective in many cases, or feed the bird bruised garlic bulb freely, mixed with bread crumbs.

9. Egg Eating.—Egg eating is a bad habit which is the outcome of overcrowding, lack of exercise and the use of nests opened to the light. The birds scratch in the open nests and break an egg or two, or find a broken egg under their roosts; they eat it, and this starts the habit. The only remedy is to use dark nests and leave a few china eggs lying about the floor for the birds to pick at; after picking at the china eggs for a time without obtaining any results, they soon cease picking at the egg in hopes of getting a dainty tit-bit. Egg eating is a difficult habit to cure, the hatchet is the most effective remedy.

10. Roup.—Roup attacks fowls in various ways; the most reliable symptom is noticed while the fowl is at roost, and consists of a rattling noise which sounds like water thrown on coals of fire. The noise is caused by the fowl breathing through the windpipe and nostrils, which have become clogged. An offensive odor is noticed and a discharge at the nostril started; this in a few days becomes hardened so the fowl can breathe only through the mouth. In other cases the rattling only is noticed and no discharge at the nose. One of the surest methods is to see if the odor is present and to look at the roof of the mouth where in nearly all cases of roup a yellow, offensive deposit is noticed.

Roup is one of the highly contagious diseases, and is mostly communicated to healthy birds by the medium of the drinking trough. One sick bird will by this means infect a whole flock. The disease is easily recognized, as the bird's head swells and a foul discharge proceeds from the eyes and nostrils. When the disease has made great headway it is safest to kill the bird, because a disgusting fungus has grown in the throat, giving rise to the term 'diphtheric roup.' It is then very dangerous and is communicable to children.

Treatment.—Isolate the affected birds; disinfect all their roosts, nests and houses, destroy or at least thoroughly cleanse with disinfecting fluid all drinking and feeding utensils, and for some time afterwards add a little Stockholm tar to the drinking water. As for the affected fowl, bathe their heads frequently with hot water and Condy's Fluid. Use a syringe to clean the nostrils and throat, injecting a solution of bluestone and warm water, sufficient bluestone to turn the water pale-blue. Be sure to prevent the bird swallowing any quantity of this, as it is a poison. On first observing the symptoms of roup, give the bird a dose of Epsom salts. Afterwards the best treatment is a pill containing two grains of quinine morning and night. The only certain way to prevent the re-appearance of disease is to kill the affected birds and thoroughly cleanse and disinfect the houses and runs.

Another Cure.—Take a small quantity of glycerine and put into it a couple of drops of essence of wintergreen. Pour this into the fowls' nostrils and in the throat. Find by experience that this is the best thing for roup or if the eyes are swollen or closed. Do not let the disease get too far advanced. Treat it at once. Use lime on the dropping boards. Keep charcoal and grit where they can get plenty of it. Then if they get roup or a bad cold they will not get diarrhoea, which weakens them so that they cannot be treated satisfactorily. A little ginger in the food is good.

11. Diseases of the Crop.—The crop may become subject to two distinct troubles: (1) Inflammation or catarrh; (2) Croup-bound, in which the crop, failing to expel its contents, becomes obstructed with food and distended.

(1) *In catarrh*, the crop is distended but soft; sometimes the bird appears to be sick and vomits. By suspending the head downwards and applying gentle pressure on the distended crop, the offensive contents may be expelled through the mouth. After the crop has been emptied, administer two grains of subnitrate of bismuth and

grain of baking soda in a teaspoonful of water. Keep the bird without food for 24 hours and then feed only sparingly on soft food. Repeat the operation if necessary.

(2) *For crop-bound*, the following is recommended: Pour a little sweet oil into the mouth and cause the bird to swallow it. Then manipulate that portion of the crop nearest the throat by careful pressure and squeezing between the thumb and finger in such a way as to break up the contents of the crop and force it toward the mouth in small pieces. Suspend the bird head downward from time to time and press the loosened particles toward the head so they will escape. With care and patience the crop may be entirely emptied, if oil is administered as often as is required to soften contents. After this is accomplished, give two grains of baking soda. Keep without food for a day and then feed sparingly on soft food until recovered.

12. Cholera.—The cholera of domestic poultry is a virulent, usually fatal, contagious disease. It is caused by infection with the specific germ of the disease. It attacks all varieties of domestic fowls, and has been observed in wild birds inhabiting an infected district. The disease when it once makes its appearance in a flock that has free range is difficult, almost impossible, to control. Where fowls are kept in semi-confinement, the disease may be readily mastered if prompt measures are taken as soon as it is discovered. Infection takes place usually through food or drink which has been fouled by discharges of diseased birds. The germs also gain entrance to the body by the inhalation of dust in infected coops, which have not been properly disinfected, or through inoculation of wounds with the germs contained in discharges which have fouled the feet, claws and beaks of the birds. The blood and raw flesh of diseased birds will, if eaten by well fowls, transmit the disease to them. Pigeons, sparrows and wild birds may spread the contagion when the disease is present in a neighbourhood. The disease may be introduced by the purchase of an infected bird. Always be sure that a bird is healthy before you permit it to run with well fowls. Cholera makes its appearance in a flock in from a few days to nearly three weeks after infection with the germ. The length of time for its appearance and the severity of the early symptoms depend largely on the susceptibility and condition of the bird exposed to contagion and the virulence of the germ.

Symptoms.—The bird loses appetite, and is usually very thirsty; drinks water eagerly until it cannot retain the water in its crop, and spills it whenever its head is lowered. Bird has high fever, and if the bulb of a thermometer is held close to the flesh under the shoulder it will often register a temperature of 108 to 110 degrees. The crop is usually distended with food which cannot pass on, owing to the paralysis of that organ. The bird shows a disposition to sleep, bunches itself into a dumpy ball of ruffled feathers, with wings drooped, and avoids the rest of the flock. The comb is pale and of a sickly, yellowish colour; face and wattles appear bloodless, and the eyes are dull and almost closed. The bird loses strength and flesh rapidly. Frequently an attempt to move result in the bird falling, unable to rise again. Diarrhoea is always present. At first there is a slight looseness of the bowels; that part of the excrement which is in health pure white, becomes yellowish or yellowish green. Copious discharges of glary mucus follow rapidly, may be frothy and streaked with yellow and green. The droppings are voided frequently and vary from deep yellowish colour to a mottled green and yellow, becoming later a deep green. The excrement is thin, often frothy. The vent frequently appears raw and scalded by the excrement. Feathers about the vent are soiled and caked by the excrement. Death usually takes place in a few days after the appearance of the first symptoms. Some cases appear in a mild form, and merge into chronic infectious diarrhoea; all birds so affected should be killed and cremated. Examination of the body after death shows great wasting of flesh, pale face and comb, full crop, inflamed and discoloured intestines, liver greatly enlarged and soft and filled with dark blood, gall bladder distended, contents thick and dark greenish, kidneys and the small tubes leading from them are usually filled with yellow or yellowish-green masses.

Treatment.—Medicinal treatment for true cholera is of little value. The disease is so rapidly fatal that it is rarely discovered until too late to attempt treatment. The best treatment is to prevent the disease. Its spread in an infected flock may be prevented by prompt isolation of the sick birds, through disinfection of the runs and houses with a 5 per cent sulphuric acid solution, and the disinfection of the water. For disinfection of the drinking water and for general use as a mild, effective intestinal antiseptic there is no better poultry remedy than napreol; use, according to the severity of the case, from one to two teaspoonfuls in each two gallon bucket of drinking water. No attempt to treat birds sick with cholera should be made unless they are valuable. For the safety of the rest of the flock, they should be strangled and cremated. No particle of the flesh or blood of the diseased bird should be permitted where a fowl may get it, and so become infected. After removing the sick birds from the flock, thoroughly disinfect the houses and runs. As a precautionary measure, use napreol in the drinking water. In addition to this, give any birds showing a suspicious looseness of the bowels, though not apparently sick, a three-drop dose of spirits of camphor made into a small pill with bread crumbs and a little sugar twice daily for three or four days. Mercury bichloride 3x tablets are an effective remedy. Give one tablet three times daily or dissolve twelve tablets in each quart of drinking water.

The chief symptoms to depend on in diagnosing cholera are: (1) A rapidly fatal disease, accompanied by copious yellowish-green or deep green diarrhoea; (2) frequent discharge of excrement, pale face, comb and wattles; (3) sleepiness which may last until death, and which is ushered in with convulsions and piteous cries; (4) infection of a large number of birds in one flock.—(Dr. Woods.)

Sulpho-Carbolate of Zinc has proven a good preventive, and, in mild cases, a remedy, at several of the poultry stations. Dose—A teaspoonful to a gallon of drinking water, given to the flock, or those affected, for several days.

13. Entero-hepatitis or Blackhead.—This disease has been known for some years as a common and fatal disease of turkeys.

Symptoms.—There are no prominent symptoms by which the disease can be diagnosed during life, and it is only by the examination of the internal organs after death that the trouble is recognized. The disease runs a chronic course, and birds do not show signs of illness until just before death, when the pathological changes are so far advanced as to preclude medicinal treatment. These changes are to be observed in the liver and caeca. The caeca are two elongated blind pouches at the lower end of the small intestines. In the normal fowl they are of uniform diameter throughout, the walls thin and the mucus membrane pale; they are filled with a rather dry, greenish excrement. In entero-hepatitis one or both caeca have their walls greatly thickened, either throughout or in spots. The mucus membrane is deeply reddened and eroded, and from this inflamed surface there is poured into the caeca a quantity of creamy material or exudate more or less tinted with blood. The liver also shows marked alterations. It is enlarged and darkened, due to engorgement with blood, and scattered over its surface are round spots, sometimes whitish or again with yellowish tinge. These spots are so distinct that no one can fail to recognize them.

Prevention.—Isolation of the sick and disinfection of the houses occupied by the healthy. Particularly is it important to guard the young birds which are more susceptible to the contagion. It will therefore be best where the disease has been prevalent to remove the young to new quarters, where the trouble has never before existed, rather than trust to the ability to completely disinfect the old houses and runs.

NOTE.—The remedies (—X) mentioned on page 9 paragraphs 6 and 7, and page 12 paragraph 12 (cholera treatment) are included in the homeopathic remedies.

II. LICE.

According to Dr. Woods there are nine varieties of body lice affecting poultry, but as they all look more or less alike to the average poultry keeper, we will not attempt to describe each variety separately. Each of the varieties has some favourite part of the fowl's body which it inhabits in preference to other parts and seldom trespasses on the domain of the neighbouring varieties. There are two of the nine varieties which are exceptions to this rule, and which are known as wandering lice; they are common to all parts of the fowl, being found more abundantly on the skin of the abdomen, among the fluffy feathers. These wandering lice not infrequently leave the fowl to attach themselves to persons who may handle the birds, or travel from one fowl to another on the roost at night, and may even be found in the material or on the walls in badly infested buildings.

Lice do not, as is popularly believed, suck the blood of their victims. Their mouths are made for biting and chewing feathers and the scales of the skin. They are a source of much irritation to the fowl by their constant running about and scratching the skin with their sharp claws. Their presence will so worry a fowl and cause such irritation of the skin that the functions of the bird will be interfered with, and sickness may result if lice are in considerable numbers. It is also probable that these vermin carry infectious matter from sick fowls to well ones, and that they also may act as the intermediate hosts of worm parasites.

Lice may be rapidly spread through a flock by contact with lousy fowls; one infested bird being capable of distributing the vermin throughout a large flock. As the favourite seat of attack of the most common variety is in the downy feathers immediately about the vent, they may cause so much irritation and soreness as to result in indifferent or improper intercourse, and so result in infertile eggs. In young chicks they cause dumpishness, drooping wings, indifference to food, and if present in large numbers, may stunt or kill the chicks. Every adult fowl is more or less lousy, and we must not flatter ourselves that our fowls are free from them. It is a good rule to treat every fowl with suspicion, and examine it carefully for lice, as they are almost certain to be present in force when we least expect to find them. If you think a bird is not affected, carefully examine the feathers about her head, look under the large wing feathers next to the shaft, and then turn the fowl up quickly and examine the feathers and the skin below the vent; if your eyes and fingers are quick enough you will find them on every adult fowl you examine. The presence of one or two need not cause any alarm but if a large number are found means should be taken at once to get rid of the vermin.

Prevention.—One of the best means of keeping this pest down is the dust bath. The dust bath should be 'dust' in name only. Fowls will wallow and dust themselves more often and to better advantage if they are provided with a wallow of soft, easily friable, slightly damp earth. This should be provided for them out-of-doors in some sheltered spot in the summer-time and in one corner of the house in winter. When fowls are exercising freely and seem to frequent the dust baths, or wallow and enjoy themselves therein at frequent intervals, there will seldom be a dangerous number of lice present.

Treatment.—Dusting fowl with a good lice powder that contains a considerable percentage of tobacco dust is an effective means of getting rid of vermin, but it is too tedious to use where a large number are to be treated. A good liquid lice-killer is an efficient means of fighting lice, and is easily used.

Two good dusting powders can be made as follows: Add one-half an ounce of 90 per cent carbolic acid to a peck of freshly air-slaked lime and stir thoroughly; or take sifted coal ashes, one-half peck, four fluid ounces of any good light liquid lice killer,

mix thoroughly, and then add tobacco dust bulk for bulk. In using dusting powders, they must be thoroughly worked into the feathers, down to the skin, if they are to be efficacious, and it will be necessary to dust regularly at weekly intervals for at least three dustings in order to get rid of the successive crops of lice.

Liquid lice killer may be used on the roosts and dropping boards, or the fowl may be placed in a box, the floor of which has been painted with the liquid, and a box lightly covered with burlap to confine the bird and partially prevent the escape of the fumes of the lice killer, at the same time allowing sufficient air for the fowl to breathe. As the nits or eggs of lice hatch in about a week after they are laid, and as lice mature in from one to two weeks, one treatment with the lice killer will not be sufficient to get rid of them, since the young lice will be newly hatched every few days, and several treatments given at weekly intervals will be found necessary.

III. MITES.

There are several varieties of tiny blood sucking mites to be found in carelessly kept poultry houses. These vermin are not lice, and they live and breed in the cracks and crevices about the poultry houses, particularly at the joints of the roosts or under accumulated droppings. They will breed in any part of the poultry house where they can hide by day and sally out at night and attack the fowls on the roosts. They are able to live for a long time without feeding on the blood of fowls, and are frequently found in poultry houses that have been deserted for a number of years. They are white or grayish in colour, except when filled with blood, when they vary from red to black. They will attack sitting hens, frequently worry hens so much as to drive them from the nests, and kill young chicks. When mites are discovered, vigorous means should be adopted to get rid of them.

Treatment.—The fowls should be treated with a liquid lice killer, and removed to other quarters. The poultry-house should be subjected to a thorough cleaning and the free use of some good disinfectant or lice killing fluid. In some cases it will be found necessary to fumigate the house thoroughly with burning sulphur. Liquid lice killers should be freely used on the dropping boards and roosting poles. Even if you are positive there are no mites in your poultry house, it is a wise plan to inspect the roosts and dropping boards carefully at regular intervals to make sure that they have not invaded the premises, as they are frequently brought into the poultry house by wild birds like sparrows, or may be brought in in litter material or by rats or mice. There are several varieties of the blood-sucking mites of various sizes.

1. The Scaly Leg Mite.—A very troublesome enemy to poultry is the scaly leg mite which produces the unsightly disease known as a scaly leg. To get rid of these pests, keep the poultry house clean and wholesome, and use liquid lice killer frequently about the roosts and dropping boards.

Treatment.—To cure scaly leg, one of the best means is to make a saturated solution of naphthalene flakes in kerosene (coal oil), and dip the fowl's legs in the solution several times, at intervals of two or three days, until the crusts are all easily moved. Three or four dippings will usually cure a severe case. Another good remedy is to use an ointment made by mixing a teaspoonsful of coal oil with a cupful of lard, applying it freely. There are a number of insects which affect poultry not as common as the foregoing, but the remedies advised will be found effective in treating all of them.

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IV. INTESTINAL WORMS.

The intestines of domestic fowls commonly become invaded with worms. These belong to three classes: round worms, tape worms and flukes.

1. Round Worms have a cylindrical body, tapering at either end, like an earth worm, and vary in length from one-fourth of an inch to five inches. Of these seven species have been recorded from the domestic fowl.

2. Tape Worms are flat, ribbon-like, elongated and slender, varying according to the species, from one-twelfth of an inch to 4 or 5 inches in length. They are composed of numerous segments. Nine species have been found in fowl.

3. Flukes differ from others in being less elongated or thread-like, but have a round or oval form, and are more or less flattened laterally. They are provided with one or more suckers by which they adhere. They are quite small, varying in the different species from one-twelfth to one-half inch in length. Five species have been found in the domestic fowl.

Symptoms.—The symptoms of intestinal worms are not marked. The birds are dull, lose strength, become thin, show no disposition to run, and are stiff in their walk. The plumage becomes rough, diarrhoea may be present and epileptic fits may intervene.

With the presence of tape worms, the same general symptoms may exist. The bird holds the head under the wing; there may be epileptic form of attacks, a stiffness of walk, or a straddling position of the legs. Sections of tape-worm may often be found by examining the excrement, but the best way to prove the presence is to kill a fowl and carefully examine the intestinal tract.

Treatment.—The control of the trouble is best effected by sanitary measures. Since the excrement is the carrier of the worms, it is evident that where the trouble is prevalent it will be best to remove the fowl to fresh grounds. The excrement should be removed daily from the houses, and the destruction of the worms and their eggs in the latter effected by mixing each lot of manure with an equal quantity of quicklime.

As medicinal treatment several valuable remedies have been suggested. Oil of turpentine is one of the remedies for all intestinal worms, two teaspoonfuls administered once daily.

For tape worms a teaspoonful of powdered pomegranate root bark mixed with the food intended for 50 birds. This should be followed with a dose of castor oil, two to three teaspoonfuls to a like number.